Lumenaut Ltd.

Use of Decision Trees in the Legal Profession

Litigation

June 2008

Lumenaut Decision Tree is used in the legal profession to help lawyers decide whether to proceed with a case or not. The two most common applications are in litigation and criminal cases.

Litigation

One of the most important decisions that a lawyer can make is whether to bring a case to court, settle out of court or abandon. The wrong decision at best leaves value on the table and the worst decision could result in hefty losses to the client and if the case is contingent, the practice itself. Rationalizing your decision based on the best available facts concerning the case and the likelihood of particular outcomes will provide a better informed platform on which to make your final decision. Lumenaut Decision Tree helps you clearly layout the various potential outcomes of the case and calculates the most advisable course of action to take.

In a contingency fee case, the lawyer is only paid if the case is successful. In effect the lawyer is venturing (betting) their time against the legal fee they will receive if they win the case. In making the decision whether to take a case or not, most lawyers prefer to go with their previous experience with similar cases. This is fair enough and can provide relatively good success rates but is not the best method.

Any method that can improve the accuracy of your Take Case/Don't Take Case decision will have a measurable impact on your bottom line, as follows:

1. Reduce costs by taking on less cases likely to fail; and
2. Increase revenue by taking on cases more likely to win.

Improvements to decision accuracy are particularly valuable when dealing with cases that fall into a greyer area of uncertainty, as we now can more accurately separate the wheat from the chaff. This may help improve your bottom line by opening up a new market area you previously avoided due to poor ability to judge the chance of a particular cases success.

Here is a simple example as can be applied to any case you are thinking of taking:

Average Expected Value = (Expected Award x Chance of Winning Case) – Costs (legal and other)

If EV is positive we would decide to take the case, if EV is negative we would not take the case, as we would be expecting to make a loss. It is clear that the EV is dependent on three factors *Award*, *Chance of Winning the Case* and the *Costs*. For each individual case they will be different and we will have to use our available factual data, judgment and experience to fill in these blanks.

Let's try some simple hypothetical examples:

Average EV = $ 1m x 0.1 -$ 0.2 m
= -0.1 m

We would not take this case, as clearly we would be expecting to lose money.

Average EV = $ 0.5m x 0.7 -$ 0.1 m
= $ 0.15 m

We would take this case, as there is a reasonable monetary return.

Average EV = $ 0.5m x 0.5 -$ 0.2 m
= $ 0.05 m

We may take this case on monetary terms, but is it best for the client, given the mental and emotional effort required for the EV?

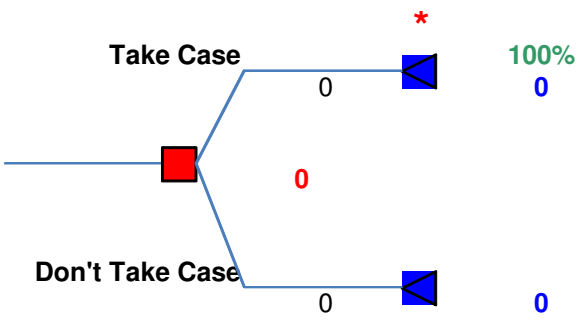
If you have a simple one step decision point dependant on only a few variables, such as the above examples, then pencil or paper will suffice in obtaining a meaningful result. However, if you have a more complex problem or you wish to recalculate different options quickly then you will require something a bit more powerful. We will now move on to the use of the ***Lumenaut*** Decision Tree which enables you to layout your decision problem graphically, and carry out sensitivity analysis on different part of your decision problem.

Lumenaut Decision Tree Hypothetical Case I.

Mrs. Linda Loman's, husband Bill purchased an automobile from his local car dealer, three days after he took ownership of his shinny new conveyance, the brakes failed on the highway and the car careered off the road slamming into a brick wall dispatching the unfortunate Bill. Mrs. Loman was later shocked to hear from the Insurance company that they would not honor Bills policy stating that they believe that Bill deliberately killed himself to get the payout for his family. The distraught Mrs. Loman contacted you to enquire about suing the insurance company.

Most if not all decisions can be broken down into a series of steps, so let's add the first tree fork, See Exhibit 1.

Exhibit 1 *Take Case* / *don't Take Case* Decision Node



How to:

Excel > Tools > Decision Tree > Create Tree

Replace Cell C2 *Fork_A* with *Take Case* and Cell C9 *Fork_B* with *Don't Take Case*. Delete the 2 in Cell D3 as not required.

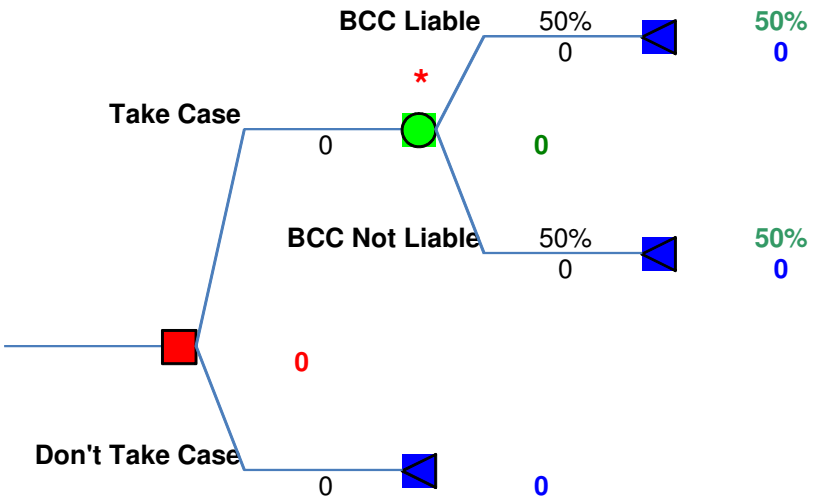
What is a Decision Node?

The red square represents a decision node, the tree *makes* a decision on which fork to select as the preferred route through the tree. The red star above a particular fork indicates the preferred decision. Try it out, type 5 into D10, the red star will now move down to the *Don't Take Case* decision fork. The Expected Value (EV) now equals 5.

The tree's decision nodes can be set to either prefer the highest value or the lowest value. Just click on the red square node itself to set.

Next we will add the possible results of the case, that is Big Car Corp is found liable or not. As this is not a decision but a possible outcome we use a Probability Node, see Exhibit 2.

Exhibit 2 *Big Car Corp Liable* / *Big Car Corp Not Liable* Probability Point



How to:

Click the *Take Case* Fork Blue Triangle, a form will appear, check the probability node type, and then add two branches.

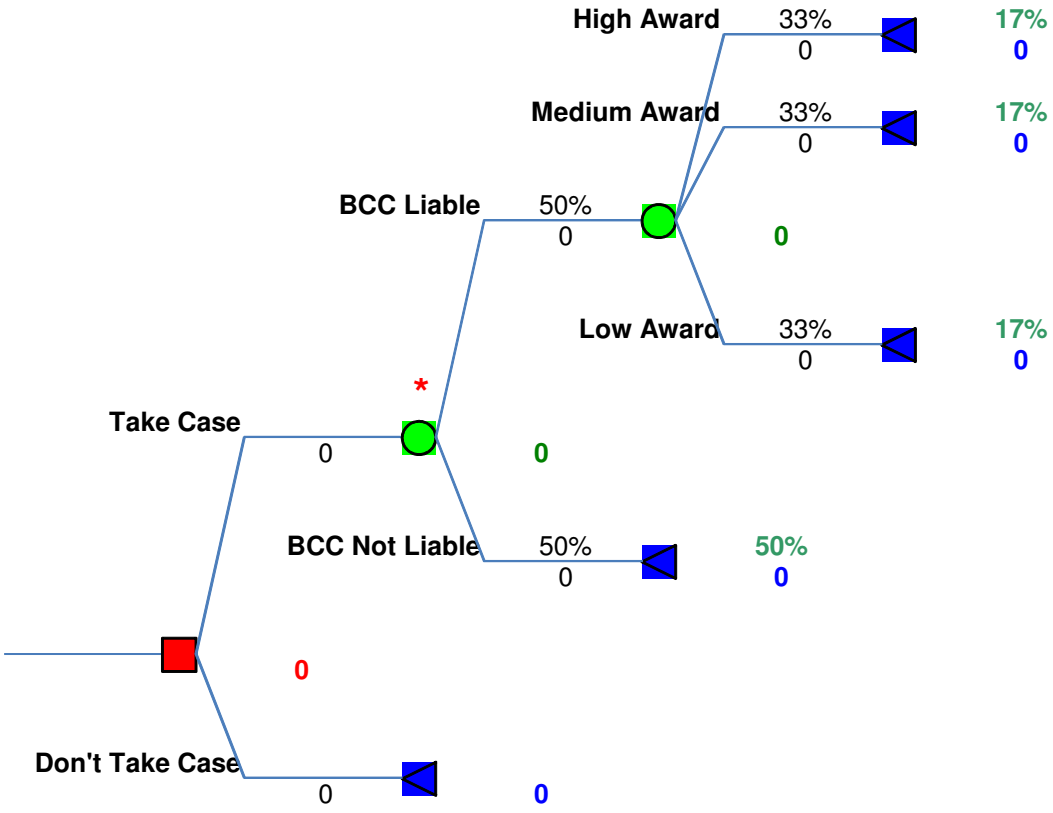
Replace Cell F2 *Fork_A* with *BCC Liable* and Cell F9 *Fork_B* with *BBC Not Liable*.

What is a Probability Node?

The green circle represents a probability node, the tree calculates the expected value from each fork and sums them to give the value colored green in the cell to the right of the node. The concept of an expected payout is simple, if say you think there is a 50 percent chance of winning $100 in a lottery then the average expected payout = 50 percent chance x $100 = $50. Try it out, type 10 into G3, and 5 into G10, the green cell now give 7.5, which is equal to (10 x probability of 0.5) + (5 x probability of 0.5).

The final stage in laying out the tree structure, is the one of most interest, the expect award should the case be successful. We have three scenarios, a High, Medium and Low Payout, see Exhibit 3.

Exhibit 3 *Award Payout* Probability Point



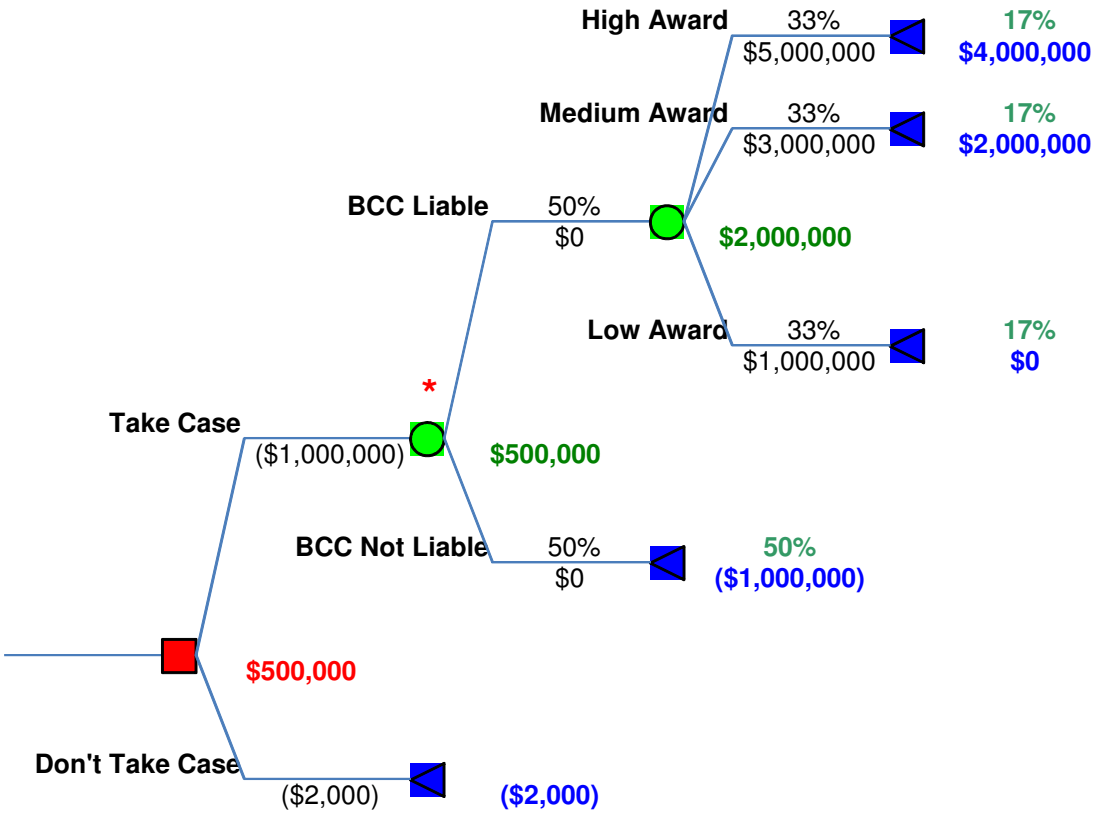
How to:

Click the *BBC Liable* Blue Triangle, a form will appear, check the probability node type, and then add three branches.

Replace Cell I2 *Fork_A* with *High Award*, Cell I5 *Fork_B* with *Medium Award*, and Cell I12 *Fork_C* with *Low Award*.

Now the structure of the decision tree model is complete, we now add our assumptions for the model. First we will add the expected values, Exhibit 4, the probabilities stay as original for now.

Exhibit 4 Decision Tree with Expected Values Added



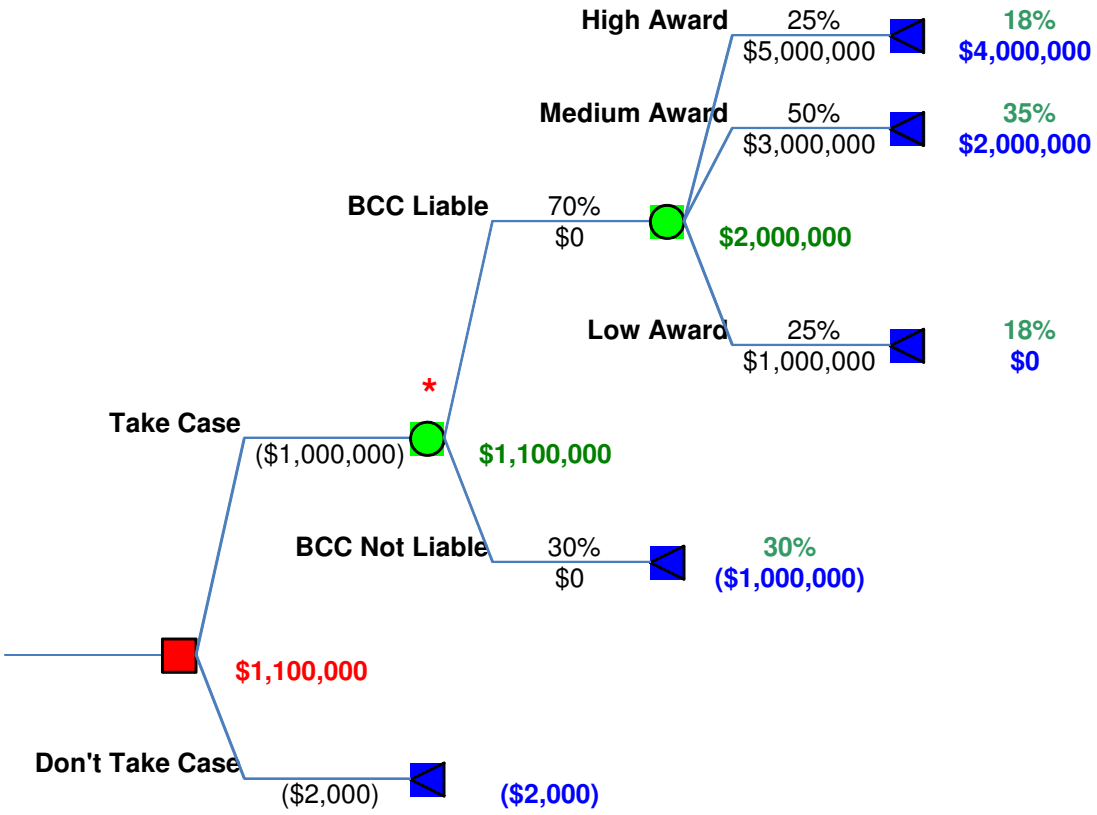
Add Values:

First add the expected legal costs if we take the case $ 1 million to Cell D16.

Now the expected Awards: A High Award of $ 5 m in Cell J3, a Medium Award of $ 3 m in cell J6, and a Low Award of 1 million in Cell J13.

Finally, we add our expected probabilities, Exhibit 5. We now see that the preferred decision path through the tree is to *Take Case*, as indicated by the red star above the green probability node, with an expected payout of $ 1.1 m. The alternative decision *Don't Take Case* has an expected cost of $2,000 and of course is the un-preferred option.

Exhibit 5 Decision Tree with Probabilities Added



Add Probabilities:

In this case, the evidence is strong so we are expecting a good chance we will win, so we enter 70 percent into Cell G8, and 30 percent into G19. Remember for any probability node the total of all forks must equal 100 percent.

Now the expected Awards: A High Award of 25 percent in Cell J4, a Medium Award of 50 percent in cell J7, and a Low Award of 25 percent in Cell J14.

However, after further investigation we discover that there is evidence that Bill may have tampered with the cars brakes to deliberately "fake" his accidental death in order to deliver his life insurance payout to his family. The case just got harder to prove and so the certainty of the findings in favor of the plaintive have to be revised down, in this case we think to 10 percent, Exhibit 6. As we are now looking at an expected loss of ($ 200,000) should we *Take Case*, compared with the much lesser loss of ($ 2,000) if we *Don't Take Case*. As this is a contingent case, this means that the client gets nothing and the practice takes an opportunity cost of $ 200,000. Therefore, we would clearly not recommend proceeding with the case on financial grounds, but it could be pursued *Pro Bono* of course.

Exhibit 6 Decision Tree with Revised Chance of Winning Case